Introduction to LaTeX

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3 février 2025

Preparing an article using LaTeX

- LaTeX is not a requirement
- Using Microsoft Word is also possible
- Word (or OpenOffice) may be more familiar
- To follow their style requirements, journals provide templates
- See for example the website of the Journal of the American Physical Society
- But APS do not provide any Word template ...
- First, read carefully the "author guidelines" page of the journal
- Here we will show how to prepare a document using LaTeX

Example of a LaTeX document ".tex" 1/2

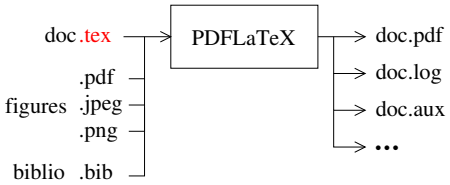
```
\documentclass[a4paper]{article}\documentclass[a4paper]{article}

%Language and font encodings%Language and font encodings
\usepackage[english]{babel}\usepackage[english]{babel}
\usepackage[utf8x]{inputenc}\usepackage[utf8x]{inputenc}
\usepackage[T1]{fontenc}\usepackage[T1]{fontenc}

%Sets page size and margin%Sets page size and margin
\usepackage[a4paper,top=3cm,bottom=2cm,left=3cm,right=3cm]{geometry}\usepackage[a4paper,top=3cm,l

%Useful packages%Useful packages
\usepackage{amsmath}\usepackage{amsmath}
\usepackage{graphicx}\usepackage{graphicx}
\usepackage[colorlinks=true, allcolors=blue]{hyperref}\usepackage[colorlinks=true,
allcolors=blue]{hyperref}

\title{Your Article Title}\title{Your Article Title}
\author{Your Name}\author{Your Name}
```

Example of a LaTeX document ".tex" 2/2

```
\begin{document}\begin{document}
\maketitle\maketitle

\begin{abstract}\begin{abstract}
Your abstract.
\end{abstract}\end{abstract}

\section{Introduction}\section{Introduction}
Your introduction goes here! Some examples of commonly used commands and
features are listed below, to help you get started. If you have a question, please use
the help menu ("?") on the top bar to search for help or ask us a question.

\section{Some examples to start}\section{Some examples to start}
\subsection{How to add Comments}\subsection{How to add Comments}
Comments can be added to your project by clicking on the comment icon in the
toolbar above. To reply to a comment, simply click the reply button in the lower right
corner of the comment, and you can close them when you're done.

\bibliographystyle{plain}\bibliographystyle{plain}
\bibliography{sample}\bibliography{sample}

\end{document}\end{document}
```

LaTeX . . . or not LaTeX . . .

- Not WYSIWYG
- You need to "compile" your .tex file ≫
- You need to learn some commands
- But Tools (today Overleaf) will help you
- The .tex document may be opened with a simple text editor
- Splits the form from the content
- A single instruction deals with the form of the document
- Even social science researchers use it !



LaTeX Compiler

Let's try by yourself

- Today we will use the online LaTeX editor : Overleaf
  - It will provide both LaTeX compiler and interface
  - Useful automatic command completion
  - Documentation
  - Review style sheets

⚠ Your files are on servers, somewhere . . .

- On your computer
  - Install Latex
  - Install an interface as Texmaker
  - Then you have to download the journal style sheet

Command structure

\ to start a command

\command

```
to know LaTeX \Large is important
```
to know LaTeX is important
```
to know LaTeX {\Large is} important
to know LaTeX \textsf{is} important
```

\command{argument}

```
to know LaTeX \textit{is very} important
```
to know LaTeX *is very* important

\command{argument1,argument2,. . .}

```
to know LaTeX \textcolor{red}{is very} important
```
to know LaTeX is very important
```
to know LaTeX \textcolor{red}{\textit{is very}}
important
to know LaTeX \textit{\textcolor{red}{is very}}
important
```

\command[option]{argument}

Command structure

Environment

```
\begin{env}
. . .
  some text, commands
. . .
\end{env}
```

```
\begin{itemize}
  \item first
  \item second
  \item third
\end{itemize}
```

- first
- second
- third

enumerate environment

```
\begin{enumerate}
  \item first
  \item one more
  \item second
  \item third
\end{enumerate}
```

1. first
2. second
3. third

1. first
2. one more
3. second

Special Characters

\	backslash	`\backslash`
~	unbreakable space	`\verb+~+`
$	to open and close equation mode (TEX)	`\$`
&	separates columns (table environment)	`\&`
%	commented line	`\%`
#	uses in command definition	`\#`
^	power (equation mode)	`\verb+^+`
_	index (equation mode)	`\_`
{ }	delimitation of command arguments	`\{ \}`

.tex file structure

```
\documentclass{article}                    call article.cls file
\usepackage[utf8]{inputenc}
\usepackage[T1]{fontenc}
\usepackage{graphicx}
\usepackage{amssymb,amsmath}
\setlength{\parindent}{0in}
\begin{document}
      ⋮
  your text
      ⋮
\end{document}
```


Document hierarchy

```
\documentclass[11pt, landscape, twocolumn, leqno,...]{article}
\usepackage{graphics}
  ⋮
\begin{document}
  \section{Section Name}
    \subsection{Subsection Name}
      \subsubsection{Subsubsection Name}
        \paragraph{Paragraph Title}
          \subparagraph{Subparagraph Title}
\end{document}
```


A possible article structure

```
\documentclass[11pt, landscape, twocolumn, leqno,...]{article}
\title{Your title}
\author{author' name}\affiliation{laboratory}
\adress{laboratory adress}
\begin{document}
\maketitle
\begin{abstract}Your abstract\end{abstract}
\section{Introduction}
\section{Methods}
\section{Results}
\section{Discussion and Conclusion}
\section{Acknowledgments}
\bibliographystyle{stylename.dtx}
\bibliography{bibfile.bib}
\end{document}
```

Label and Reference : a useful couple

- \label{**mark**} tag an object
- \ref{**mark**} refer to the tagged object
- Object could be :
  - chapter, section, subsection, appendix
  - figure, table
  - equation
  - code listing, algorithm
  - item in a list

```
\section{Results}\label{sec:res}

As seen in section \ref{sec:res} the influence of \dots
```

13. Results

As seen in section 13 the influence of ...

Equation : embedded in the text

equation \{a x∧2 = 0\} gives...

equation $ax^2 = 0$ gives...

Variables should be written using equation mode

The number \{N\}of particles ...

The number N of particles ...

Equation mode provides Greek letters

\{\alpha\beta\gamma\,\omega\quad\Omega\}

$\alpha\beta\gamma\,\omega \quad \Omega$

\, and \quad provide spaces.

Labelled and not labelled equations

The solution of the harmonic oscillator reads
\[x(t)=X_m\cos(\omega t+\varphi)\]

$$x(t) = X_m \cos(\omega t + \varphi)$$

Let us consider the integral
```
\begin{equation}
  \int_{x=0}∧{\infty\frac{x}{x∧2+1} dx
  \label{eq :equation1}
\end{equation}
```
The solution of Eq.~\eqref{**eq :equation1**} gives...

Let us consider the integral

$$\int_{x=0}^{\infty} \frac{x}{x^2+1} \mathrm{d}x \qquad (1)$$

The solution of Eq.(1) gives...

Figure

- \usepackage{graphicx} *to include in the preamble*
- \includegraphics[scale=2]{graphe.pdf} *to include the figure*
- [width=largeur,height=hauteur,scale=valeur,angle=angle,...]
- *other possible options ...*
- *other figure formats are allowed* `.png` `.jpeg`

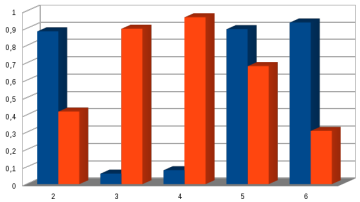
```
\includegraphics[width=3cm]{graphe.pdf}
\includegraphics[width=3cm,angle=90]{graphe.pdf}
```

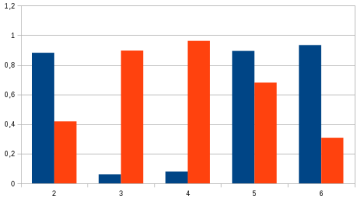
Figure Environnement

```
\begin{figure}[htb]
  \centering
  \includegraphics[width=3cm]{graphe.pdf}
  \caption{Your caption.}\caption{A strawberry pie.}
  \label{fig :tag}
\end{figure}
```

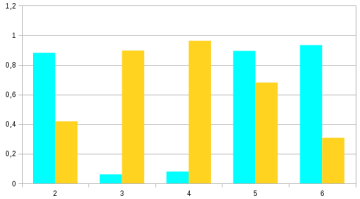
Figure 1 – A strawberry pie.

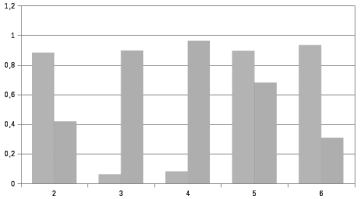
Preparing figures 1/2





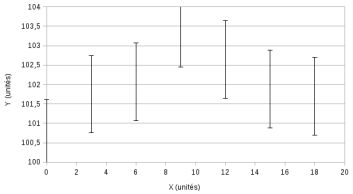
Avoid flurishes (here 3D bars) but improve the lecture of the data.

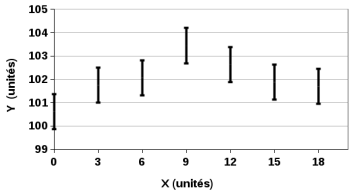




Pay attention to black and white reproduction.

Preparing figures 2/2





Take big enough character size.

Table

```
\begin{tabular}{clr}
time   & x      & y \\
0      & 0.25   & 1.45 \\
10     & 0.75   & 2.98 \\
25     & 0.99   & 3.27
\end{tabular}
```

t	x	y
0	0.25	1.45
10	0.75	2.98
25	0.99	3.27

Table

```
\begin{tabular}{clr}
\(t\) (s) & \(x\) (nm) & \(y\) (nm)\\
0     & 0.25  & 1.45 \\
10    & 0.75  & 2.98 \\
25    & 0.99  & 3.27
\end{tabular}
```

t (s)	x (nm)	y (nm)
0	0.25	1.45
10	0.75	2.98
25	0.99	3.27

Table

```
\begin{tabular}{c|l||r}
\(t\) (s) & \(x\) (nm) & \(y\) (nm)\\
0     & 0.25  & 1.45 \\
10    & 0.75  & 2.98 \\
25    & 0.99  & 3.27
\end{tabular}
```

t (s)	x (nm)	y (nm)
0	0.25	1.45
10	0.75	2.98
25	0.99	3.27

Table

```
\begin{tabular}{clr}\hline
\(t\) (s) & \(x\) & \(y\)\\\hline
0     & 0.25  & 1.45 \\
10    & 0.75  & 2.98 \\
25    & 0.99  & 3.27 \\\hline
\end{tabular}
```

t (s)	x (nm)	y (nm)
0	0.25	1.45
10	0.75	2.98
25	0.99	3.27

Table

```
\begin{tabular}{clr}\hline
      &\multicolumn{2}{c}{coordinates}\\
\(t\) (s) & \(x\) & \(y\)\\\hline
0     & 0.25  & 1.45 \\
10    & 0.75  & 2.98 \\
25    & 0.99  & 3.27 \\\hline
\end{tabular}
```

	coordinates	
t (s)	x (nm)	y (nm)
0	0.25	1.45
10	0.75	2.98
25	0.99	3.27

Table

```
\begin{tabular}{clr}\hline
 &\multicolumn{2}{c}{coord.}\\\cline{2-3}
\(t\) (s) & \(x\) & \(y\)\\\hline
0      & 0.25  & 1.45 \\
10     & 0.75  & 2.98 \\
25     & 0.99  & 3.27 \\\hline
\end{tabular}
```

	coord.	
t (s)	x (nm)	y (nm)
0	0.25	1.45
10	0.75	2.98
25	0.99	3.27

Table Environnement

```
\begin{table}[htb]
  \centering
  \begin{tabular}{clr}\hline\(t\) (s)&\(x\) (nm)&\(y\)
  (nm)\\\hline 0&0.25&1.45\\10&0.75&2.98&25&0.99&\\
  3.27\\\hline\end{tabular}
  \caption{Your caption.}\caption{Trajectory of point $A$.}
  \label{fig :tag}
\end{table}
```

	coord.	
t (s)	x (nm)	y (nm)
0	0.25	1.45
10	0.75	2.98
25	0.99	3.27

Table 1 – Trajectory of point A.

Bibliography

- *Once the* `.bib` *file is exported from Zotero, to construct the bibliography is simple*

  \bibliographystyle{stylename.dtx}

  \bibliography{bibfile.bib}

- `stylename.dtx` *is provided by the journal*
- `bibfile.bib` *should contains all cited references*
- *Each reference in the* `bibfile.bib` *has a tag. It is recalled by the* \cite{**reftag**} *command*